Surface Water Quality Comment

The Davidson Canyon water quality sample taken by Errol Montgomery and Associates (ELM 2008) is not characteristic of the flows of Davidson Canyon upstream of Interstate Highway 10. Based on the high concentrations of sulfate (> 300 mg/l) and TDS (> 800 mg/l) reported in 2008 by ELM and the proximity of the site to the confluence with Cienega Creek (see Map), it would appear that the waters in the ELM "Davidson" site and Cienega Creek are similar, perhaps suggesting a mixing of subsurface flows along both creeks.

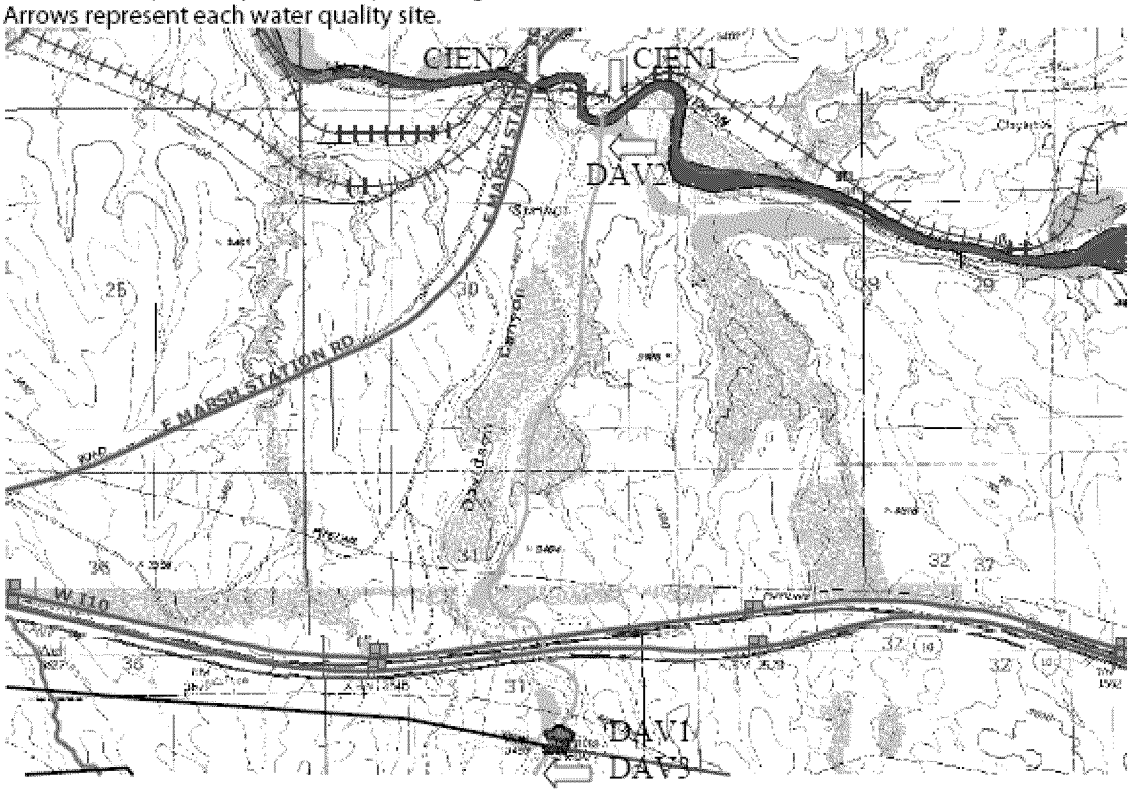
Samples collected for Pima County Flood Control District along Lower Davidson Canyon between June 2002 and January 2003 showed vastly different results, with sulfate levels less than 100 mg/l and TDS not exceeding 520 mg/l (PAG, 2003a). The results from 2003 indicate more of a similarity in the waters at both sites in Davidson Canyon as opposed to an influence by Cienega Creek subsurface flows.

Change in subsurface geology could be reflected in the water quality recently recorded at the two Davidson Canyon sites. The Pantano formation occurs all along lower Cienega Creek and in lower Davidson Canyon up to Interstate 10, whereas bedrock within Davidson Canyon south of the Interstate mostly consists of granitic rocks (PAG, 2003b). The Cienega Basin Source Water Study (PAG, 2000) compared waters from Cienega Creek with those of another tributary, Posta Quemada Spring, which has bedrock consisting of granitic rocks similar to the Middle Davidson Canyon site. Samples from the study showed levels of sulfate, sodium, magnesium, calcium and total dissolved solids in Posta Quemada that are similar to recent samples collected by PAG at DAV3, which are significantly lower than recent samples collected along Cienega Creek and in Lower Davidson Canyon.

MAP

Davidson Canyon is represented by an orange line

Arrows represent each water quality site.



References

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Pima Association of Governments (PAG). 2000. Lower Cienega Basin Source Water Study: Final Project Report. Prepared for the Pima County Flood Control District. October 2000.

Pima Association of Governments (PAG). 2003a. Contributions of Davidson Canyon to base flows in Cienega Creek. Prepared for the Pima County Flood Control District. November 2003.

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Table 1. Comparison of Water Quality in Davidson Canyon to EPA Standards

Analyte	MCL	Unit	Lower Davidson Cyn (ELM, October 2008)	Middle Davidson Cyn DAV 3 (PAG, September 2008)
Metals				
Aluminum	0.5 – 2.0	mg/l	< 0.03	< 0.20
Antimony	0.006	mg/l	0.0012	< 0.003
Arsenic	0.05	mg/l	0.0026	0.0026
Barium	2.0	mg/l	0.158	0.23
Beryllium	0.004	mg/l	< 0.0001	< 0.001
Cadmium	0.005	mg/l	<0.0001	< 0.001
Calcium	--	mg/l	101	86
Chromium	0.1	mg/l	< 0.01	< 0.001
Copper	1.3	mg/l	< 0.01	0.0022
Iron	0.3[a]	mg/l	0.04	0.081
Lead	0.015	mg/l	< 0.0001	< 0.001
Magnesium	--	mg/l	25.9	14
Manganese	0.05[a]	mg/l	0.032	0.074
Mercury	0.002	mg/l	< 0.0002	< 0.0002
Molybdenum	--	mg/l	0.07	< 0.01
Nickel	--	mg/l	< 0.01	0.0021
Potassium	--	mg/l	3.5	5.4
Selenium	0.05	mg/l	0.0022	< 0.002
Silver	0.1		< 0.01	< 0.01
Sodium	--	mg/l	51.4	28
Thallium	0.002	mg/l	< 0.0001	No Sample
Zinc	5.0[a]	mg/l	< 0.01	< 0.05
Wet Chemistry				
Alkalinity as CaCO3	--	mg/l	332	300
Bicarbonate Alkalinity as CaCO3	--	mg/l	366	300
Carbonate Alkalinity as CaCO3	--	mg/l	19.2	< 6.0
Chloride	250[a]	mg/l	36.3	6.5
Cyanide (total)	0.2	mg/l	< 0.005	No Sample
Fluoride	4.0	mg/l	0.8	0.53
Nitrate/Nitrite as N	10.0	mg/l	0.81	0.36
pH	6.5 – 8.5			7.82
Sulfate	250[a]	mg/l	327	42

Total Dissolved Solids (TDS)	500[a]	mg/l	860	370
Turbidity	0.5 – 1.0	NTU	No Sample	No Sample

[a] Secondary Maximum Contaminant Level

Table 2. Comparison of Water Quality in Cienega Creek to EPA Standards

Analyte	MCL	Unit	Lower Cienega Creek		Cienega Creek @ Tilted Beds (October 2008)
			June 2008	October 2008	
Metals					
Aluminum	0.5 – 2.0	mg/l	< 0.03	< 0.03	< 0.01
Antimony	0.006	mg/l	0.0005	< 0.0004	0.0004
Arsenic	0.05	mg/l	0.0035	0.0030	0.0083
Barium	2.0	mg/l	0.054	0.060	0.278
Beryllium	0.004	mg/l	< 0.0001	< 0.0001	< 0.0001
Cadmium	0.005	mg/l	< 0.0001	< 0.0001	0.0002
Calcium	--	mg/l	186	148	186
Chromium	0.1	mg/l	< 0.01	< 0.02	< 0.01
Copper	1.3	mg/l	< 0.01	< 0.02	< 0.01
Iron	0.3[a]	mg/l	< 0.02	0.02	0.34
Lead	0.015	mg/l	< 0.0001	< 0.0001	0.0003
Magnesium	--	mg/l	50.1	40.7	33.4
Manganese	0.05[a]	mg/l	0.017	0.09	1.11
Mercury	0.002	mg/l	< 0.0002	< 0.0002	< 0.0002
Molybdenum	--	mg/l	< 0.01	0.03	0.02
Nickel	--	mg/l	< 0.01	< 0.01	< 0.01
Potassium	--	mg/l	4.8	4.5	5.4
Selenium	0.05	mg/l	< 0.0001	0.0001	0.0001
Silver	0.1		--	< 0.02	< 0.01
Sodium	--	mg/l	71.5	65.0	47.5
Thallium	0.002	mg/l	< 0.0001	< 0.0001	0.0001
Zinc	5.0[a]	mg/l	< 0.01	0.01	0.11
Wet Chemistry					
Alkalinity as CaCO3	--	mg/l	275	278	294
Bicarbonate Alkalinity as CaCO3	--	mg/l	323	315	346
Carbonate Alkalinity as CaCO3	--	mg/l	6	12	6
Chloride	250[a]	mg/l	12.2	12.2	8.4
Cyanide (total)	0.2	mg/l	<0.005	< 0.005	< 0.005
Fluoride	4.0	mg/l	0.6	0.6	0.5
Nitrate/Nitrite as N	10.0	mg/l	0.03	0.68	3.71
pH	6.5 – 8.5		6.23	6.86	6.40
Sulfate	250[a]	mg/l	486	365	379
Total Dissolved Solids (TDS)	500[a]	mg/l	1050	840	890
Turbidity	0.5 – 1.0	NTU	No Sample	No Sample	No Sample

[a] Secondary Maximum Contaminant Level